COSEWIC
Status Appraisal Summary

on the

Spotted Bat
Euderma maculatum

in Canada

SPECIAL CONCERN
2014

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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COSEWIC
Assessment Summary

Assessment Summary – November 2014

Common name
Spotted Bat

Scientific name
Euderma maculatum

Status
Special Concern

Reason for designation
This distinctly patterned bat is found in the dry intermontane grasslands of southern British Columbia. A cliff-roosting bat, its patchy distribution and specialized roosting needs suggest a relatively small population size. The main threats to foraging habitat in valley bottoms or roosting locations are urban development, land conversion for orchards and vineyards, roads, mining and exploration, recreational activities (e.g., rock climbing), and light and noise pollution. This bat may be susceptible to White-nose Syndrome if this disease spreads west. Its specialized habitat requirements and slow reproductive rate will affect recovery.

Occurrence
British Columbia

Status history
Designated Special Concern in April 1988. Status re-examined and confirmed in May 2004 and November 2014.

COSEWIC
Status Appraisal Summary

Euderma maculatum

Spotted Bat — Oreillard maculé

Range of occurrence in Canada: British Columba

Current COSEWIC Assessment:

Designated Special Concern in April 1988. Status re-examined and confirmed in May 2004 and November 2014.

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units: yes ☐ no ☒

Explanation:

There is no change.

Range:

Change in Extent of Occurrence (EO): yes ☒ no ☐ unk ☐

Change in Index of Area of Occupancy (IAO) : yes ☐ no ☐ unk ☒

Change in number of known or inferred current locations*: yes ☒ no ☐ unk ☐

Significant new survey information yes ☒ no ☐

Explanation:

EO was calculated as 10,600 km^2 in the last status report and AO was described as 'unknown'. There have been few directed surveys of this species since the last status report. Opportunistic records have increased the known distribution. Sarell *et al.* (2011) reported a significant westerly range extension with an auditory detection at Sebring Creek, Carpenter Lake, west of Lillooet. Otherwise, surveyors have reported the persistence of this species, using acoustic and visual surveys, within previously known range (Iredale and Ferguson 2007, Sarell *et al.* 2011, Lausen pers. comm. 2014). Although there is confidence in the delineation of the core distribution, search effort in some potential areas within and outside this distribution is still lacking (see below).

Based on BC Ministry of Environment (2013; Figure 2) EO of the Spotted Bat in Canada is 59,005 km^2 (Figure 1), and the IAO (2x2 grid) was calculated as 472 km^2, including 4 observations from the BC CDC dataset (B.C. Conservation Data Centre, unpubl. data 2014) not shown by BC Ministry of Environment (2013; Figure 2). The number of current locations that is each subject to a potential threatening event is unknown, but has likely increased since the last assessment as a result of some additional records and is certainly > 10.

* Use the IUCN definition of "location"

Population Information:

Change in number of mature individuals:	yes ☐ no ☐ unk ☒
Change in population trend:	yes ☐ no ☐ unk ☒
Change in severity of population fragmentation:	yes ☐ no ☒ unk ☐
Change in trend in area and/or quality of habitat:	yes ☐ no ☒ unk ☐
Significant new survey information	yes ☐ no ☒

Explanation:

As of 2004, there were 80 records of Spotted Bats in British Columbia (COSEWIC 2004), and recent records assembled by the B.C. Conservation Data Centre (unpubl. data 2014) have increased that number to at least 93. However, these do not include all occurrence data for this species that have been received to date (Stipek, pers. comm. 2014).

Since the series of roost emergence counts reported in COSEWIC (2004), Iredale and Ferguson (2007) recorded incidental observations at Seton Lake and the Back Valley. Sarell *et al.* (2011) reported 3 confirmed and 9 potential auditory detections, but did not specify the locations of confirmed detections, except for the Sebring Creek site, which represented a westward extension to the known range. Lausen (pers. comm., 2014) captured two lactating females near previously known roosts in south Okanagan during one night of effort, and 7 individuals, including 4 lactating females and 2 volant juveniles, on the Fraser River near Lillooet in 2014. In the latter site, Spotted Bats were the only bat species captured and appeared to be abundant; by contrast there was no evidence of this species in 6 other surveyed sites in the area. Reproduction by Spotted Bats in B.C. had previously been reported by Leonard and Fenton (1983).

The BC Ministry of Environment (2013) cautions that surveys for Spotted Bats have not been systematic and that some regions such as the north Okanagan Valley and Fraser Valley have received little survey attention. Areas that have been surveyed were typically chosen due to a perceived high habitat potential for roosting, which includes cracks and crevices on cliff faces (BC Ministry of Environment 2013; Lausen, pers. comm. 2014).

The reasons for designation from the May 2004 COSEWIC assessment included the statement "It is considered the easiest and best censused species of bat in Canada", which is now known to be incorrect. The occurrence and abundance of Spotted Bats across their range was estimated in the past using maternity roost emergence surveys and other standard survey methods. However, roost locations in much of the species' range in BC outside the Okanagan Valley are either unknown or inaccessible. Standard bat capture methods often employ low-level mist nets, whereas intense effort using elevated mist nets is required to capture Spotted Bats (Rodhouse *et al.* 2005, Luce and Keinath 2007). The common acoustic survey method for bat detection using zero-crossing technology is inadequate for differentiating the lower frequency calls of the Spotted Bat (11-18 kHz) from background noise (Lausen pers. comm. 2014). Time expansion bat detecting systems, which provide full spectrum sonograms and high quality recording of Spotted Bat calls, have only been available for practical use (portability and affordability) for the past 5 years. Nevertheless, field workers may miss the signature of Spotted Bats if their detector is set to default settings or adjusted to settings that are too high to detect this species.

Spotted Bats are naturally patchy in distribution, and they tend to be found, even at relatively high abundance levels, where low-elevation and extensive cliff habitats occur in dry habitats, and are absent in large intervening areas (Luce and Keinath 2007, Lausen pers. comm. 2014). In summary, it is uncertain whether the Spotted Bat population in Canada numbers fewer than 1,000 mature individuals, as concluded by COSEWIC (2004). Overall survey effort for Spotted bats has been insufficient to reliably estimate numbers.

Threats:

Change in nature and/or severity of threats: yes ☐ no ☒ unk ☐

Explanation:

COSEWIC (2004) concluded that there were no obvious threats to habitats used for foraging or roosting by Spotted Bats and actual or imminent threats were limited to disturbance to cliff roosting sites, loss of riparian foraging habitat, and impact of pesticides on the moth prey base.

BC Ministry of Environment (2013) used IUCN-CMP (World Conservation Union – Conservation Measures Partnership) unified threats classification system (Conservation Measures Partnership (2010) in order to assess the threats to this species. The overall cumulative impact of multiple threats was considered Medium, based on 6 Low Impact (Level 1) threats: urban development, land conversion for agricultural purposes, roads, mining and exploration, renewable energy (e.g., wind turbines), recreational activities (e.g., rock climbing) and light and noise pollution. An additional threat not considered is the potential for flooding of valley bottoms, where specialized roosting habitats are located.

White-nose Syndrome, caused by the fungus *Pseudogymnoascus destructans*, was identified as a potential threat of unknown magnitude. This pathogen has caused population declines in several species of cave-hibernating bats in eastern North America (see COSEWIC 2013), and has been spreading west (White-nose Syndrome.org 2014). The vulnerability of Spotted Bats to this disease, if it reaches British Columbia, is unknown, but may be low if the species hibernates in cliffs or crevices in B.C. or the U.S., rather than caves, as speculated by Nagorsen and Brigham (1993). One year (2013-14) of acoustic data collected by Lausen (pers. comm. 2014) in the National Wildlife Area on Vaseux Lake, detected Spotted Bats for the last time in 2013 in mid-October, and for the first time in 2014 in mid-March. This means that individuals either migrated from the area or hibernated locally for 5 months. A lack of genetic diversity across Oregon, Washington, and British Columbia suggests that this species does not migrate over long distances (Walker *et al.* 2014).

Protection:

Change in effective protection: yes ☐ no ☒

Explanation:

Over 90% of Spotted Bat range occurs outside of protected areas (COSEWIC 2004, BC Ministry of Environment 2013). Spotted Bat is listed as a species at risk under the BC *Forest and Range Practice Act*, enabling habitat management tools as per the Identified Wildlife Management Strategy (Province of British Columbia 2004); one Wildlife Habitat Area has been approved at Criss Creek near Kamloops to manage forestry and range activities for this species (BC Ministry of Environment 2013).

Rescue Effect

Change in evidence of rescue effect: yes ☒ no ☐

Explanation:

Global status is Apparently Secure (G4). The NatureServe rank of the species in Washington, which borders Spotted Bat range in British Columbia, is S3. It is ranked S2 or S3 in all other US states in the bat's range (NatureServe 2014). Spotted Bats are not widespread in Washington state, and are not well surveyed. They have been recorded in 7 counties in the eastern part of the state (Hayes and Wiles 2013; Figure 2), but may be more common than formerly believed in Washington and Oregon due to the ineffectiveness of standard survey methods (Rodhouse *et al.* 2005, Luce and Keinath 2007, Hayes and Wiles 2013; NatureServe 2014).

Movements of individuals between British Columbia and Washington have not been documented, but there is a string of records extending northward through the Washington side of the Okanogan Valley to the BC border (Figure 2). Therefore, it seems likely that there are some movements between BC and Washington State (Wiles 2014). Similar habitat-related threats are evident on the Washington side of the border, although the area is somewhat less intensively developed than the BC side of the valley (Wiles 2014). The two records in the far eastern part of Washington (Pend d'Oreille county; Figure 2) are located in high cliff density habitat, but so far Spotted Bats have not been detected on the adjacent BC side of the border (Lausen, pers. comm. 2014).

COSEWIC (2004) invoked rescue effect as a reason to consider Spotted Bats Special Concern rather than Threatened. It is unknown whether any population exchange that may occur across the border in Okanagan Valley is sufficient to rescue the BC population should it decline or disappear. The possibility of demographic rescue is not addressed in the BC Management Plan (BC Ministry of Environment 2013).

Quantitative Analysis:

Change in estimated probability of extirpation: yes ☐ no ☒ unk ☐

Details:

None

Summary and Additional Considerations: [e.g., recovery efforts]

Less than 5% of the Spotted Bat's global range is in Canada. This bat is restricted to the dry interior of southern BC (Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones). The availability of suitable cliffs and crevices that offer protection, suitable thermal conditions for roosting, and proximity to feeding areas and water sources may be limiting and may explain the apparently discontinuous distribution of this species. Expansion of human population and land conversions continue to occur in this area of BC, but lack of monitoring of Spotted Bat populations, distributions, or habitats precludes understanding of impacts of such changes. The overall population trend is unknown, and previously used survey methods are now believed to have been insufficient to estimate occurrence and abundance. Six low-impact threats have been identified by the BC Ministry of Environment, leading to an overall impact of Medium. The likelihood of rescue from the United States is unclear. A Management Plan with a threats assessment was published in 2013 (BC Ministry of Environment 2013).

The Spotted Bat is now ranked S3S4 (vulnerable to apparently secure) in British Columbia (B.C.).

A recent genetic study that applied microsatellite (N = 17) and mitochondrial markers (control region) to 118 museum and recently collected samples across the species' range (western North America, Canada to

Mexico) found a total of 16 haplotypes. Specimens from BC, Washington and Oregon were characterized by only a single haplotype, while 10 haplotypes occurred in the southwestern U.S. (and not in northwestern North America) (Walker *et al.* 2014).

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*Denotes that information was provided by authority contacted.

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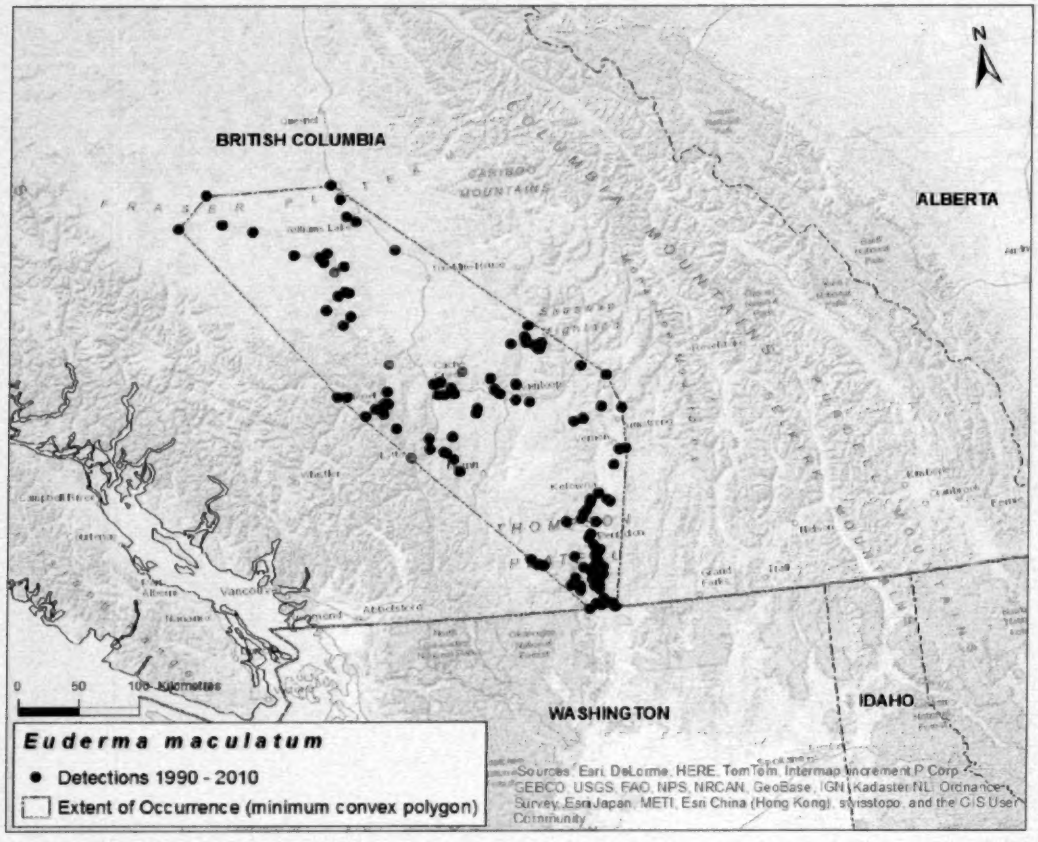
N
BRITISH COLUMBIA
ALBERTA
WASHINGTON
IDAHO
0 50 100 Kilometers
Euderma maculatum
Detections 1990 - 2010
Extent of Occurrence (minimum convex polygon)
Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Figure 1. Extent of occurrence of the Spotted Bat in Canada. Data from B.C. Ministry of Environment (2013). Red points are additional observations from the B.C. Conservation Data Centre (B.C. CDC unpubl. data 2014).

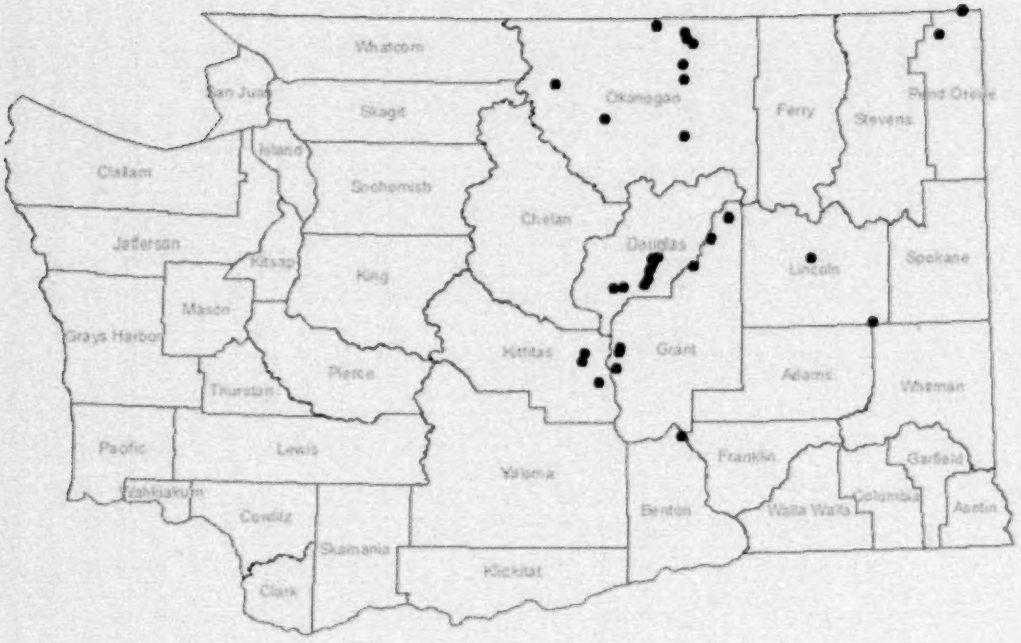

Figure 2. Spotted Bat records in Washington since 1991. Source: Washington Department of Fish and Wildlife (Wiles, pers. comm. 2014).

TECHNICAL SUMMARY

Euderma maculatum

Spotted Bat — Oreillard maculé

Range of occurrence in Canada: British Columbia

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines(2011) is being used)	Unknown
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Unknown
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	Unknown
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	59,005 km²
Index of area of occupancy (IAO) (Always report 2x2 grid value).	472 km²
Is the population "severely fragmented" i.e., >50% of its total area of occupancy is in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a large distance?	No
Number of locations* (use plausible range to reflect uncertainty)	Unknown, but many more than 10
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No

* See Definitions and Abbreviations on COSEWIC website and IUCN 2010 for more information on this term.

Is there an [observed, inferred, or projected] continuing decline in number of subpopulations?	Unknown
Is there an [observed, inferred, or projected] continuing decline in number of locations*?	No
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	No
Are there extreme fluctuations in number of subpopulations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each subpopulation)

Subpopulation (give plausible ranges)	**N Mature Individuals**
Total	Unknown

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	N/A

Threats (actual or imminent, to populations or habitats)

Urban development, land conversion for agricultural purposes, roads, mining and exploration, renewable energy (e.g., wind turbines), recreational activities (e.g., rock climbing), light and noise pollution, and potential for flooding in valley habitats.

Rescue Effect (immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada?	S3 in Washington
Is immigration known or possible?	Unknown, but possible
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely?	Unknown

Data-Sensitive Species

Is this a data-sensitive species?

No

COSEWIC Status History

Designated Special Concern in April 1988. Status re-examined and confirmed in May 2004 and November 2014.

Recommended Status and Reasons for Designation

Recommended Status: Special Concern	**Alpha-numeric Code**: Not applicable
Reasons for Designation: This distinctly patterned bat is found in the dry intermontane grasslands of southern British Columbia. A cliff-roosting bat, its patchy distribution and specialized roosting needs suggest a relatively small population size. The main threats to foraging habitat in valley bottoms or roosting locations are urban development, land conversion for orchards and vineyards, roads, mining and exploration, recreational activities (e.g., rock climbing), and light and noise pollution. This bat may be susceptible to White-nose Syndrome if this disease spreads west. Its specialized habitat requirements and slow reproductive rate will affect recovery.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. No declines
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable. IAO is below 500 km^2, but is likely underestimated. EO > 2000 km^2.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable. Population may be small, but no evidence of decline.
Criterion D (Very Small or Restricted Population): Not applicable. Population numbers unknown, but may be small overall.
Criterion E (Quantitative Analysis): Not applicable. No quantitative analysis.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canac (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2014)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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